Great Miami River Watershed Project
US EPA Watershed Initiative Grant Proposal

Submitted by Miami Conservancy District
November 20, 2002

Great Miami River Watershed Project
US EPA Watershed Initiative Grant Proposal
Submitted by Miami Conservancy District
November 20, 2002

Characterization of the Great Miami River Watershed and Overall Watershed Planning Effort

The Great Miami River watershed is located in southwestern Ohio and drains an area of 5,300 square miles (**Map 1**) including portions of fifteen Ohio counties. Principal tributaries to the Great Miami River (170.3 miles in length) include the Stillwater River, the Mad River, and Loramie Creek. Portions of the Stillwater River and Greenville Creek have been designated by Ohio as State Scenic Rivers. The Great Miami River originates just above Indian Lake in Logan County, Ohio and outlets to the Ohio River just west of Cincinnati. Downtown Dayton, Ohio marks the confluence of the Mad and Stillwater Rivers with the Great Miami. The Great Miami River Watershed has a population of 1.5 million people and more than 75% of the population resides in the urban areas surrounding Dayton, Cincinnati, Hamilton, and Troy. Approximately 83% of the land within the watershed is used for agriculture, primarily row-crop production of corn, soybeans, and wheat. Typical livestock include swine, cattle, and poultry. Residential, commercial, and industrial lands account for approximately 12% of land use in the watershed, with the remaining area consisting of forests (4%) and water bodies or wetlands (1%). Major industries located in the Watershed produce automobile parts, chemicals, household goods, paper products, and processed foods and beverages.

Broad-Based Stakeholder Involvement

Miami Conservancy District (MCD) helped establish the Great Miami River Watershed Network to include the diverse interests of stakeholders and to create a watershed action plan for the entire watershed. The Network includes more than 40 representatives from community-based watershed organizations and represents the sub-watersheds, businesses, public agencies, local governments, regional planning agencies, and citizens of the Great Miami River Watershed. In areas of the watershed not covered by any active watershed group or initiative (**Map 2**), MCD is actively working with stakeholders to organize local groups to develop watershed action plans that protect and improve water resources in their areas. Watershed enhancement strategies developed by

the Network are reviewed and prioritized by a **Watershed Advisory Committee,** comprised of representatives from each community-based watershed organization who act as stewards of the entire Watershed and recommend priorities in the best interest of all. The projects in this proposal were identified by the Watershed Advisory Committee as having high priority and an immediate need for reducing impairments.

MCD recently completed 12 community meetings held at locations throughout the Great Miami River Watershed seeking input on the Watershed Plan. These meetings helped define strategic priorities for improving water resource protection and restoration, and attaining water quality standards. All projects identified in this proposal relate to the strategic priorities identified at the 12 community meetings. Community input reinforced the need for three overarching principles to guide the short and long term goals of the Watershed Plan. The first principle is that **broad stakeholder involvement** will be the basis of a successful strategy. The second is that adequate data is needed to demonstrate **environmental results** and support sound management decisions. The third principle is that economic tools including **market incentives** should be used to motivate needed changes.

Drinking Water Resources

The U.S. Environmental Protection Agency (USEPA) has designated much of the buried valley aquifer system **(Map 3)** underlying the Great Miami River Watershed as a Sole Source Aquifer. The permeable of sand and gravel deposits within the buried valley aquifer result in the transmission of large quantities of water and are readily recharged due to the lack of extensive impermeable layers. Many municipalities have located their well fields on top of the buried valley aquifer. The connection between surface and ground water is so extensive that Ohio EPA has designated a portion of Dayton's drinking water wells, which serve more than 440,000 consumers, as producing "Ground Water Under the Influence of Surface Water." Private wells and smaller public water systems throughout the Great Miami River Watershed also draw water from the aquifers.

Problems and Threats to the Great Miami River Watershed

According to the Ohio EPA, of over 1000 stream miles assessed in the Great Miami River Watershed, 613 (58.8%) meet the aquatic life standards for their aquatic use designation; 206 stream miles (19.8%) partially attain the aquatic life standards while 223 stream miles (21.4%) do not meet the aquatic life standards due to

water quality impairments (**Maps 4-7**). In 2001, according to reports by the Water Quality Lab at Heidelberg College, 9801 metric tons of nitrates were discharged from the Great Miami River into the Ohio River. The condition of the Great Miami River Watershed is crucial to the health of the streams within its boundaries as well as the Ohio River and other receiving watersheds downstream – including the Gulf of Mexico.

Ohio EPA has developed a 15-year schedule for issuing Total Maximum Daily Loads (TMDLs) in watersheds with substantial impairment **(Map 8**). Nearly all sub-watersheds in the Great Miami River Watershed are scheduled for TMDL development including the Mad River, Twin Creek, and the Great Miami River. TMDL development began in the Stillwater Watershed in 2001. The Ohio EPA 303(d) List of Prioritized Impaired Waters (Category 5) has subwatersheds of the Stillwater River listed as highest priority in Ohio for TMDL Development.

The main source of impairment in the Great Miami River Watershed is nonpoint source pollution and includes: nutrient enrichment in streams, excess sediment in waterways, and habitat alterations (Ohio EPA 1998, 2000c). Nonpoint source pollution is an issue for both urban and agricultural areas. Agricultural activities often result in degradation or removal of streamside vegetation that allows sediment, chemicals, pathogens, and nutrients to enter the stream. Urban areas contribute to nonpoint source pollution through storm water runoff from impervious surfaces. Sedimentation also impacts the capacity of streams and jeopardizes MCD's flood protection system that continuously protects more than a million people and 2.75 billion dollars of property.

Great Miami River Watershed Plan Description

MCD's efforts in the Great Miami River Watershed include flood protection, surface and groundwater monitoring, greenspace protection, development of recreation areas, and river corridor restoration and protection. The long and short-term goals listed below are included in the organization's strategic plan and are the foundation Miami Conservancy's holistic Watershed Plan. During its 87-year history these efforts have been successful due to partnerships and coordination with both public and private organizations.

GOAL 1. Restore and protect the quality of water resources in the Great Miami Watershed.

- Protect and restore forested river corridors through fee simple acquisition or conservation easement.

- Provide support to community-based watershed organizations in the sub-watersheds.
- Partner with other agencies to mitigate non-point source pollution.
- Partner with local communities to implement conservation-oriented storm water treatment practices.

GOAL 2. Develop public education & outreach program to support/enhance the watershed plan.

- Use local mass media to promote the community's relationship to streams.
- Promote methods for elected officials to understand, value, and care for the watershed.
- Provide direct programming to youth and community groups.
- Assist local communities with NPDES Phase 2 stormwater permit requirements.

GOAL 3. Collect and analyze water resource data that supports sound watershed management.

- Develop biological assessment capability for stream monitoring.
- Partner with USGS to develop a continuous surface water quality monitoring network.
- Improve regional stream, precipitation, and flood forecasting information to provide real-time data to Ohio Emergency Management Agency (OEMA), and USGS.
- Partner with USGS to investigate arsenic occurrence in groundwater.

GOAL 4. Enhance community recognition of the value of the watershed's rivers and streams.

- Develop new and existing recreation trails and natural areas along stream corridors.
- Publish a river recreation trail guide that promotes the use of river access.
- Develop 170-mile Great Miami River Water Trail and conduct inaugural trip with community members and elected officials.
- Sponsor a Summit to enhance and protect our rivers and streams and benefit our quality of life.

GOAL 5. Mitigate flood damage to properties within the watershed.

- Maintain and improve the integrity of the existing flood protection system.
- Provide flood protection to communities using environmentally sensitive techniques.
- Implement practices that maximize stream and floodplain processes and enhance aquatic habitat.
- Assist jurisdictions in upgrading their FEMA floodplain maps.

Description of Proposed Projects

The descriptions of the four proposed projects are summarized in this section, however a full proposal is available on request. The projects will be coordinated by Miami Conservancy District and implemented through the partnerships listed in the narrative below. Each project is fully developed and ready to begin at the grant award date and scheduled to be completed no longer than three years from the award date. Each project will produce quarterly financial and performance reports.

PROJECT 1. Reduce nutrient and sediment impairment in the Stillwater River sub-watershed through performance-based cost share payments to provide incentive for load reduction. (GOAL 2, 3 & 4)

In partnership with The Ohio State University (OSU), Stillwater Watershed Project, and USDA Natural Resource Conservation Service (NRCS), this project will initiate performance based cost-share payments that provide incentives for farmers to ensure that the best management practices (BMPs) they choose will reduce pollutant discharges to the Stillwater River sub-watershed. The project focuses on nutrient impairment and ties cost-share payments directly to specific, measurable reductions in the pollutants causing these impairments. Existing cost-share programs encourage changes in agricultural practices, but consider measurable improvements in stream quality a secondary result. The cost-share contracts proposed for this project make receipt of payments dependent on the achievement of water quality improvements. Farmers will work with local NRCS field office personnel to develop nutrient reduction strategies that will work best on their farm operation. Farm operators will be given an initial incentive payment to begin implementing their BMPs and will receive annual bonus payments as water quality targets are achieved. This project will use incentive payments to reduce pollutant outputs and demonstrate how measurable improvements in water quality can be obtained at a lower cost. The proposed contracts have been pre-tested by OSU using four different focus groups consisting of farm operators in the Great Miami River watershed.

The project will monitor water quality benefits by taking water quality samples throughout the project timeframe upstream and downstream of each participating farm operation. Samples will be collected and analyzed by a certified water analysis laboratory. A quality assurance/control plan for data collection and

analyses will be developed prior to initiation of the project to ensure the scientific usefulness of the data. The Stillwater Watershed Advisory Board will determine areas to be targeted using information from their Watershed Action Plan and Ohio EPA technical support documents so as to maximize pollution reduction. Estimated average annual pollutant loads: The operator-farmers will be required to reduce pollutant loads by approximately 30 tons per farm as projected by the Stillwater TMDL. The first year the project will determine nutrient reduction goals, work with NRCS and Stillwater Watershed Project to develop nutrient reduction plans, and write contracts with individual farmers for their nutrient reductions. The second year the project will monitor nutrient levels in streams, evaluate progress towards meeting nutrient goals, and make payments to operators that are meeting their goals. The third year the project will monitor nutrient levels in streams, evaluate progress towards meeting nutrient goals, make payments to operators that are meeting their goals, and disseminate information in a format that can be used to evaluate the project's effectiveness and reproducibility.

PROJECT 2. Reduce organic enrichment in the Stillwater River sub-watershed by upgrading failing septic systems and increasing homeowner knowledge of septic system maintenance. (GOAL 2, 3 & 4)

In partnership with the Stillwater Watershed Advisory Board and the Darke County Health District, this project will focus on reducing pollution from onsite wastewater systems in the Stillwater River sub-watershed. 70% of this sub-watershed is within Darke County. Of the streams assessed by Ohio EPA in this sub-watershed, 24% were identified with on-site wastewater treatment systems as a "source of known or suspected impact." This project is innovative in its focus of traditional solutions in an impaired sub-watershed and will show a measurable reduction of pollutants in a short time period. Within Darke County approximately 53% of homes were built prior to 1949; therefore, many of these homes may have deficient wastewater treatment because the septic systems have exceeded their life expectancy. Many more homes have no treatment systems at all. Participation and funding will be limited to homeowners with failing/substandard septic systems as determined by the Darke County Health Department. The Stillwater Watershed Advisory Board will determine areas to be targeted using information from their Watershed Action Plan and Ohio EPA technical support documents so as to maximize pollution reduction.

Homeowners may receive up to 50% cost share of the actual cost for repair or replacement. However, in situations where there is severe economic need, up to 60% cost-share of the actual cost for repair or replacement will be available. Homeowners that currently do not have risers on the inlet and outlet lids to their septic tank may qualify for free risers when they have their septic tank pumped by a participating registered septage pumper. Each of the three years of the project will budget $100,000 to pay for cost-share to qualifying property owners. The project will measure effectiveness by the number of septic systems upgraded and conducting water quality measurements in the streams targeted for septic system upgrades.

PROJECT 3. Reduce nutrient/sediment impairment in Loramie Creek sub-watershed. (GOAL 2, 3 & 4)

In partnership with The Ohio State University and Loramie Valley Alliance, this project will design and construct innovative two-stage ditches using an approach developed by The Ohio State University and the Ohio Department of Natural Resources. A Two-Stage Ditch has been shown to decrease sediment and nutrient transport, improve drainage and ecological function, increase ditch stability, and reduce maintenance. The design requires that a narrow channel be established in the bottom of a wider channel - with grassed benches on the sides of the narrow channel. This design can facilitate drainage and reduce bank failures, the frequency of over bank flows, and maintenance costs. The grassed bench acts as a floodplain, dissipating highly erosive flows and improving channel stability. The bench will also reduce downstream transport of sediment and nutrients. Typically, stream processes establish channels and benches in ditches but these features are either removed by current maintenance practices or result in narrow benches because these natural features are constrained by the geometry of the ditch. The minimum increased width necessary to establish effective stable benches will result in at least 25 percent to 100 percent increased capacity of the ditch.

Many agricultural lands in the Great Miami River Watershed are drained using modified channels to ensure use of productive soils. In many of these areas natural channels have been deepened and straightened so that water can flow from agricultural subsurface drainage outlets to maximize drainage. The need to drain fields prevents restoring these channels to a completely natural stream pattern, dimension, and profile. These channels typically have poor habitat and water quality potential. The Loramie Valley Alliance will help identify areas

that utilize drainage ditches that could be re-designed to accommodate the Two-Stage design. This project will evaluate the ecology of Two-Stage Ditches and the role of the channel and benches in improving water quality and habitat. This project will provide the participating landowner with appropriate payment for land taken out of production as well as paying for the ditch design and construction costs. The project will monitor water quality benefits by taking appropriate water quality samples throughout the project timeframe upstream and downstream of the constructed two-stage ditches. Samples will be collected and analyzed by a certified water analysis laboratory. A quality assurance/control plan, for data collection and analysis activities, will be developed prior to initiation of the project to ensure the scientific usefulness of the data. Part of the evaluation costs will be paid from a Federal Grant that was recently awarded to OSU – one of only 10 in the U.S. Details of the grant are: *Fluvial Geomorphology and Nutrient Processes in Low Order Streams in Midwestern Tile-Drained Agricultural Landscapes. USDA/EPA Nutrient Science for Improved Watershed Management Program, $690,000. Investigators. A. Ward, V. Bouchard, B. Sohngen, P Richards.*

PROJECT 4. Implementing sustainable watershed management strategies locally. (GOAL 2, 3 & 4)

In partnership with Miami Valley Regional Planning Commission (MVRPC) and local communities, cost-share incentives and training for innovative strategies will be given to assist with NPDES Phase II stormwater management requirements, water resource protection related to development, and water impairment issues. Selected communities will receive cost-share incentives when they implement innovative local strategies. Pilot projects will be used to demonstrate the benefits of sustainable development principles and serve as models for the application of local "tools" for watershed enhancement. The successful approaches will be documented in a Community Guidebook for Smart Watersheds developed by MVRPC.

The Watershed Advisory Committee and local planning commissions will develop criteria for selecting projects from a variety of settings (e.g. rural, urban, and areas experiencing rapid development). MVRPC will assist by convening planning commissions, providing oversight and support to the jurisdictions hosting the pilot projects, and providing final review of the projects to ensure that specific environmental goals are met. The Guidebook will create a framework for the watershed-wide application of land use strategies and BMPs

including stormwater management practices in communities impacted by NPDES Phase II storm water regulations and TMDL development. In the Great Miami River Watershed over 125 jurisdictions have been identified that will need NPDES Phase II storm water permit coverage. This project will assist and encourage consistent, comprehensive, and innovative solutions to address regulatory and water quality challenges. Local officials will be offered training in the use of the Guidebook and the value of its strategies. This project will be implemented over a three-year timeframe and will be sustained thereafter by Miami Conservancy's Watershed Plan based on local interest and availability of funds. The first year of the project will focus on the identification of host jurisdictions and pilot project start-up. The second year will include on-going project evaluation and evolution of the Guidebook based on project results. Aggressive marketing of the Guidebook and successful projects will begin late in the second year and proceed into Year 3. The latter part of Year 3 will include the identification of the next group of host jurisdictions and projects. The effectiveness of this effort will be measured in two ways. Water quality sampling will be utilized to assess the performance of specific projects. Affirmative actions by local governments to seek projects and/or implement Guidebook recommendations will serve as a measure of the effectiveness of this overall strategy for engaging local government in watershed enhancement efforts.

Description of Watershed Project Management and Stakeholder Involvement

MCD's Watershed Plan is coordinated and managed by a staff team of qualified professionals. The proposed projects will principally be managed by the following Project leaders.

Name	Title/Role	Qualifications	Notable Projects/Accomplishments
Dusty Hall	Watershed Manager, MCD	25 years experience with grass roots organizations and local gov't. MS, BS	• Former Assistant City Manager • Dayton Well Field Protection Program • Phase II Collaborative (35 jurisdictions) • U.S. EPA Drinking Water Hero • Governor's Blue Ribbon Task Force
Sarah Hippensteel	Watershed Coordinator, MCD	BS, MA	• Watershed Resource Policy and Planning Specialist • Projects focus on Citizen Involvement in Watershed Planning Issues • Experience includes working for private industry, state government, and nonprofit organizations.
Dr. Brent	OSU, Department	Doctorate in	• Recent research: Estimating the cost of reducing

Sohngen	of Agricultural Environmental, and Developmental Economics	Natural Resource and Environmental Economics	sediment delivery to the Toledo harbor; investigating alternative mechanisms for reducing non-point source pollution, and estimating the recreational value of Lake Erie beaches.
Dr. Andy Ward	OSU, Department of Food, Agricultural and Biological Engineering	PhD, Agricultural Engineering	• Recent Research: Fluvial Geomorphology, Naturalized Channel Restoration, Channel Restoration to Improve Stream Integrity • College of Food, Agriculture and Env. Sciences Teaching Award • USDA Award for Environmental Protection Honor Award
Scott Hammond	Miami Valley Regional Planning Commission	Director Water Quality Planning, Hydrogeologist MA, BA	• Director of Areawide Water Quality Program • Coordinates the Watershed Enhancement Project • Board Member, Greene Co. Health District
Roberta Broerman	Darke County Health District	RS	• Management of Darke County Health Districts programs and projects.

Description of Outreach Activities

Education and outreach is an integral part of MCD's watershed plan because failure to meet environmental challenges is often based upon a lack of understanding about the dramatic impact human actions have upon critical water resources. The four proposed projects demonstrate that reductions in water impairment can be made through viable, cost-effective, and easily-implemented solutions. MCD will take the knowledge gained through implementation and evaluation of these projects and transmit it in a number of ways. Each project will produce quarterly performance and evaluation reports and project fact sheets that will be available on MCD's website and by hard copy. Projects 1 and 3 will be documented in a series of Ohio State Extension Service Fact Sheets and are expected to include topics such as: Designing Cost-share Contracts that have Performance Criteria; Legal Aspects of Contract Design; and Applicability of Two Stage Ditch Design. Ohio State will also develop and maintain a website providing current results of Project 1. Project 4 will produce a Community Guidebook that will serve as tool for other communities to implement similar projects.

Additionally, through MCD's coordination of education and outreach efforts in communities affected by the NPDES Phase II Storm water regulations, we will broadly disseminate the information to citizens, technical staff, and elected officials to encourage behavior change, implementation of nonpoint source reduction projects, and the development of policies that promote water resource protection.

Appendix 1 - Budgets For Each Project and TOTAL

TOTAL Project Costs

Category	Federal $	State $	Local $	Total $
Total In-Kind		**$247,958**	**$89,833**	**$337,791**
Total Cash	**1,000,000**		**$300,000**	**$1,300,000**
TOTAL PROJECT				**$1,637,791**

PROJECT 1				
Category	**Federal $**	**State $**	**Local$**	**Total $**
Personnel	$0	$59,359	$16,800	$76,159
Fringe Benefits	$0	$15,973	$4,738	$20,711
Travel	$0	$0	$4,098	$4,098
Equipment	$0	$0	$0	$0
Supplies	$3,000	$0	$0	$3,000
Sample Analysis	$15,000	$0	$0	$15,000
Cost share	$300,000	$0	$0	$300,000
Indirect	$34,364	$164,646	$0	$199,010
Total	**$352,364**	**$239,978**	**$25,636**	**$617,978**
PROJECT 2				
Category	**Federal $**	**State $**	**Local $**	**Total $**
Personnel			$20,000	$20,000
Fringe Benefits			$3,000	$3,000
Travel				
Equipment				
Supplies				
Sample Analysis			$5,000	$5,000
Cost share	$300,000			$300,000
Indirect				
Total	**$300,000**		**$28,000**	**$328,000**
PROJECT 2				
Category	**Federal $**	**State $**	**Local $**	**Total $**
Personnel		$6,000	20,000	$26,000
Fringe Benefits		$1,980	3,000	$4,980
Travel			$500	$500
Equipment	$10,000			$10,000
Supplies	$2,500			$2,500
Subcontractual	$137,500			$137,500
Sample Analysis			$10,000	$10,000
Cost share	$1,500			$1,500
Indirect				
Total	**$151,500**	**$7,980**	**$33,500**	**$192,980**
PROJECT 4				
Category	**Federal $**	**State $**	**Local $**	**Total $**
Personnel			$65,143	$65,143
Fringe Benefits			$33,060	$33,060
Travel				
Equipment			$10,000	$10,000
Supplies	$12,319		$3,499	$15,818
Sample Analysis				
Cost share	$183,817		$126,183	$310,000
Indirect			$64,812	$64,812
Total	**$196,136**		**$302,697**	**$498,203**

** Supplies are water quality monitoring supplies, printing, and postage

Appendix 2 - Signed commitment letter(s) from active partners

Darke County General Health District

Loramie Valley Alliance

Miami Valley Regional Planning Commission

The Ohio State University, Dept of Agricultural, Environmental and Developmental Economics

The Ohio State University, Dept of Food, Agricultural and Biological Engineering

Stillwater Watershed Project

Appendix 3 - Signed support letter(s)

Audubon Ohio

Clark Soil & Water Conservation District

Darke Soil & Water Conservation District

Dayton Area Chamber of Commerce

City of Dayton, Department of Water

City of Dayton, Environmental Advisory Board

City of Miamisburg

City of New Carlisle

City of Tipp City

City of Troy

City of Vandalia

Five Rivers MetroParks

Friends of the Great Miami

Honey Creek Watershed Project

Indian Lake Watershed Project

Lower Mad River Watershed Protection Project

Montgomery Soil & Water Conservation District

The Ohio Smallmouth Alliance

Representative Dixie J. Allen, State Representative, 38th House District

Representative John Boehner, United States Representative, Ohio

Representative Gary Cates, State Representative, 58th House District, Speaker Pro Tempore

Representative Kevin DeWine, State Representative, 76th House District

Representative Gregory Jolivette, State Representative, 59th House District

South Metro Regional Chamber of Commerce

Three Valley Conservation Trust

Trout Unlimited, Mad Men Chapter

Appendix 4 - Maps

Map 1 – Great Miami River Watershed

Map 2 – Great Miami River Watershed Buried Valley Aquifer System

Map 3 – Community-Based Watershed Programs of the Great Miami River Watershed

Map 4 – Upper Great Miami River Watershed

Map 5 – Lower Great Miami River Watershed

Map 6 – Mad River Watershed

Map 7 – Stillwater River Watershed

Map 8 – Ohio 2002 Integrated Report Ohio Long-Term TMDL Schedule